

What is claimed is:

1. A combined battery and device apparatus comprising:
a first structure including:
 - 5 a first conductive layer;
 - a battery including a cathode layer; an anode layer, and an electrolyte layer located between and electrically isolating the anode layer from the cathode layer, wherein the anode or the cathode or both include an intercalation material, the battery disposed such that either the cathode layer or the anode layer is in electrical contact with the first conductive layer, and
 - 10 an electrical circuit having a major surface adjacent face-to-face to and electrically connected to the battery.
2. The apparatus according to claim 1, further comprising:
 - 15 a photovoltaic cell having a major surface adjacent face-to-face to the first structure; and
 - an integrated circuit operatively coupled to charge the battery using current from the photovoltaic cell.
3. The apparatus according to claim 1, further comprising a photovoltaic cell having a major surface adjacent face-to-face to a surface of the battery.
4. The apparatus according to claim 1, further comprising:
 - 20 a substrate, the battery having a major surface adjacent face-to-face to the substrate; and
 - a photovoltaic cell having a major surface adjacent face-to-face to a surface of the substrate beside the battery.
5. The apparatus according to claim 1, further comprising:
 - 25 a substrate, the battery having a major surface adjacent face-to-face to the substrate; and
 - a photovoltaic cell having a major surface adjacent face-to-face to an opposite face surface of the substrate from the battery.

6. The apparatus according to claim 1, wherein the electrical circuit comprises:
a photovoltaic cell having a major surface adjacent face-to-face to the battery; and
a charging circuit supported on the photovoltaic cell and electrically coupled to charge
the battery using current from the photovoltaic cell.

5

7. The apparatus according to claim 1, wherein the electrical circuit includes a thin-film
capacitor adjacent to the battery.

10

8. The apparatus according to claim 1, wherein the electrical circuit includes:
a thin-film capacitor adjacent to the battery; and
an integrated circuit mounted on the capacitor and electrically connected to the battery
and the capacitor.

15

9. The apparatus according to claim 1, wherein the electrical circuit includes:
an insulating layer adjacent to the battery; and
a plurality of electrical traces adjacent to the insulating layer, wherein at least one of the
plurality of electrical traces contacts an electrode of the battery through the insulating layer.

20

10. The apparatus according to claim 1, the electrical circuit further comprising:
an insulating layer adjacent to the battery;
a plurality of electrical traces adjacent to the insulating layer; and
an integrated circuit supported on the battery, wherein a first one of the plurality of
electrical traces electrically connects the cathode of the battery and the integrated circuit, a
second one of the plurality of electrical traces electrically connects the anode of the battery and
the integrated circuit.

25

11. The apparatus according to claim 1, the substrate further comprising:
an integrated circuit; and
an insulating layer adjacent to the integrated circuit, the insulating layer including a
plurality of through vias, wherein the battery is adjacent to the insulating layer, wherein the

30

cathode of the battery electrically connects to the integrated circuit through a first one of plurality of through vias, and the anode of the battery electrically connects to the integrated circuit through a second one of plurality of through vias.

5 12. The apparatus according to claim 1, the substrate further comprising:
an integrated circuit; and
an insulating layer adjacent to the integrated circuit, the insulating layer including a
plurality of through vias, wherein a cathode-conductor of the battery is adjacent to the insulating
layer and electrically connects to the integrated circuit through a first one of plurality of through
10 vias, the cathode layer of the battery is adjacent to the cathode conductor, the electrolyte layer is
adjacent to the cathode layer, and the anode is adjacent to the electrolyte layer and electrically
connects to the integrated circuit through a second one of plurality of through vias.

15 13. The apparatus according to claim 1, the substrate further comprising:
an integrated circuit; and
an insulating layer adjacent to the integrated circuit, the insulating layer including a
plurality of through vias, wherein a cathode-conductor of the battery is adjacent to a face of the
integrated circuit opposite the insulating layer and electrically connects to the integrated circuit
through a first one of plurality of through vias, the cathode layer of the battery is adjacent to the
20 cathode conductor, the electrolyte layer is adjacent to the cathode layer, and the anode is
adjacent to the electrolyte layer and electrically connects to the integrated circuit through a
second one of plurality of through vias.

25 14. The apparatus according to claim 1, the electrical circuit further comprising:
an insulating layer adjacent to the battery that acts as a passivation layer that protects the
anode from environmental corrosion; and
a plurality of electrical traces adjacent to the insulating layer, wherein at least one of the
plurality of electrical traces contacts an electrode of the battery through the insulating layer.

30 15. The apparatus according to claim 1, wherein the substrate has a curved shape having a

convex face and a concave face, and the battery is located on the concave face.

16. The apparatus according to claim 1, wherein the substrate comprises a polymer having a melting point substantially below 700 degrees centigrade.

5

17. The apparatus according to claim 1, wherein the substrate comprises a metal foil.

18. The apparatus according to claim 1, wherein the substrate comprises a metal foil having an insulative layer between the metal foil and the first conductive layer adjacent to a first surface area of the substrate's major surface area.

10

19. The apparatus according to claim 1, wherein the substrate comprises a ceramic.

20. The apparatus according to claim 1, wherein the substrate comprises a glass.

150

21. A method for making a combined battery and device apparatus, the method comprising:
providing a substrate having a major surface area;
depositing a first conductive layer on a first surface area of the substrate's major surface area;

200
210
220
230
240
250
260
270
280
290
300
310
320
330
340
350
360
370
380
390
400
410
420
430
440
450
460
470
480
490
500
510
520
530
540
550
560
570
580
590
600
610
620
630
640
650
660
670
680
690
700
710
720
730
740
750
760
770
780
790
800
810
820
830
840
850
860
870
880
890
900
910
920
930
940
950
960
970
980
990
1000
1010
1020
1030
1040
1050
1060
1070
1080
1090
1100
1110
1120
1130
1140
1150
1160
1170
1180
1190
1200
1210
1220
1230
1240
1250
1260
1270
1280
1290
1300
1310
1320
1330
1340
1350
1360
1370
1380
1390
1400
1410
1420
1430
1440
1450
1460
1470
1480
1490
1500
1510
1520
1530
1540
1550
1560
1570
1580
1590
1600
1610
1620
1630
1640
1650
1660
1670
1680
1690
1700
1710
1720
1730
1740
1750
1760
1770
1780
1790
1800
1810
1820
1830
1840
1850
1860
1870
1880
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
2020
2030
2040
2050
2060
2070
2080
2090
2100
2110
2120
2130
2140
2150
2160
2170
2180
2190
2200
2210
2220
2230
2240
2250
2260
2270
2280
2290
2300
2310
2320
2330
2340
2350
2360
2370
2380
2390
2400
2410
2420
2430
2440
2450
2460
2470
2480
2490
2500
2510
2520
2530
2540
2550
2560
2570
2580
2590
2600
2610
2620
2630
2640
2650
2660
2670
2680
2690
2700
2710
2720
2730
2740
2750
2760
2770
2780
2790
2800
2810
2820
2830
2840
2850
2860
2870
2880
2890
2900
2910
2920
2930
2940
2950
2960
2970
2980
2990
3000
3010
3020
3030
3040
3050
3060
3070
3080
3090
3100
3110
3120
3130
3140
3150
3160
3170
3180
3190
3200
3210
3220
3230
3240
3250
3260
3270
3280
3290
3300
3310
3320
3330
3340
3350
3360
3370
3380
3390
3400
3410
3420
3430
3440
3450
3460
3470
3480
3490
3500
3510
3520
3530
3540
3550
3560
3570
3580
3590
3600
3610
3620
3630
3640
3650
3660
3670
3680
3690
3700
3710
3720
3730
3740
3750
3760
3770
3780
3790
3800
3810
3820
3830
3840
3850
3860
3870
3880
3890
3900
3910
3920
3930
3940
3950
3960
3970
3980
3990
4000
4010
4020
4030
4040
4050
4060
4070
4080
4090
4100
4110
4120
4130
4140
4150
4160
4170
4180
4190
4200
4210
4220
4230
4240
4250
4260
4270
4280
4290
4300
4310
4320
4330
4340
4350
4360
4370
4380
4390
4400
4410
4420
4430
4440
4450
4460
4470
4480
4490
4500
4510
4520
4530
4540
4550
4560
4570
4580
4590
4600
4610
4620
4630
4640
4650
4660
4670
4680
4690
4700
4710
4720
4730
4740
4750
4760
4770
4780
4790
4800
4810
4820
4830
4840
4850
4860
4870
4880
4890
4900
4910
4920
4930
4940
4950
4960
4970
4980
4990
5000
5010
5020
5030
5040
5050
5060
5070
5080
5090
5100
5110
5120
5130
5140
5150
5160
5170
5180
5190
5200
5210
5220
5230
5240
5250
5260
5270
5280
5290
5300
5310
5320
5330
5340
5350
5360
5370
5380
5390
5400
5410
5420
5430
5440
5450
5460
5470
5480
5490
5500
5510
5520
5530
5540
5550
5560
5570
5580
5590
5600
5610
5620
5630
5640
5650
5660
5670
5680
5690
5700
5710
5720
5730
5740
5750
5760
5770
5780
5790
5800
5810
5820
5830
5840
5850
5860
5870
5880
5890
5900
5910
5920
5930
5940
5950
5960
5970
5980
5990
6000
6010
6020
6030
6040
6050
6060
6070
6080
6090
6100
6110
6120
6130
6140
6150
6160
6170
6180
6190
6200
6210
6220
6230
6240
6250
6260
6270
6280
6290
6300
6310
6320
6330
6340
6350
6360
6370
6380
6390
6400
6410
6420
6430
6440
6450
6460
6470
6480
6490
6500
6510
6520
6530
6540
6550
6560
6570
6580
6590
6600
6610
6620
6630
6640
6650
6660
6670
6680
6690
6700
6710
6720
6730
6740
6750
6760
6770
6780
6790
6800
6810
6820
6830
6840
6850
6860
6870
6880
6890
6900
6910
6920
6930
6940
6950
6960
6970
6980
6990
7000
7010
7020
7030
7040
7050
7060
7070
7080
7090
7100
7110
7120
7130
7140
7150
7160
7170
7180
7190
7200
7210
7220
7230
7240
7250
7260
7270
7280
7290
7300
7310
7320
7330
7340
7350
7360
7370
7380
7390
7400
7410
7420
7430
7440
7450
7460
7470
7480
7490
7500
7510
7520
7530
7540
7550
7560
7570
7580
7590
7600
7610
7620
7630
7640
7650
7660
7670
7680
7690
7700
7710
7720
7730
7740
7750
7760
7770
7780
7790
7800
7810
7820
7830
7840
7850
7860
7870
7880
7890
7900
7910
7920
7930
7940
7950
7960
7970
7980
7990
8000
8010
8020
8030
8040
8050
8060
8070
8080
8090
8100
8110
8120
8130
8140
8150
8160
8170
8180
8190
8200
8210
8220
8230
8240
8250
8260
8270
8280
8290
8300
8310
8320
8330
8340
8350
8360
8370
8380
8390
8400
8410
8420
8430
8440
8450
8460
8470
8480
8490
8500
8510
8520
8530
8540
8550
8560
8570
8580
8590
8600
8610
8620
8630
8640
8650
8660
8670
8680
8690
8700
8710
8720
8730
8740
8750
8760
8770
8780
8790
8800
8810
8820
8830
8840
8850
8860
8870
8880
8890
8900
8910
8920
8930
8940
8950
8960
8970
8980
8990
9000
9010
9020
9030
9040
9050
9060
9070
9080
9090
9100
9110
9120
9130
9140
9150
9160
9170
9180
9190
9200
9210
9220
9230
9240
9250
9260
9270
9280
9290
9300
9310
9320
9330
9340
9350
9360
9370
9380
9390
9400
9410
9420
9430
9440
9450
9460
9470
9480
9490
9500
9510
9520
9530
9540
9550
9560
9570
9580
9590
9600
9610
9620
9630
9640
9650
9660
9670
9680
9690
9700
9710
9720
9730
9740
9750
9760
9770
9780
9790
9800
9810
9820
9830
9840
9850
9860
9870
9880
9890
9900
9910
9920
9930
9940
9950
9960
9970
9980
9990
10000
10010
10020
10030
10040
10050
10060
10070
10080
10090
100100
100110
100120
100130
100140
100150
100160
100170
100180
100190
100200
100210
100220
100230
100240
100250
100260
100270
100280
100290
100300
100310
100320
100330
100340
100350
100360
100370
100380
100390
100400
100410
100420
100430
100440
100450
100460
100470
100480
100490
100500
100510
100520
100530
100540
100550
100560
100570
100580
100590
100600
100610
100620
100630
100640
100650
100660
100670
100680
100690
100700
100710
100720
100730
100740
100750
100760
100770
100780
100790
100800
100810
100820
100830
100840
100850
100860
100870
100880
100890
100900
100910
100920
100930
100940
100950
100960
100970
100980
100990
1001000
1001010
1001020
1001030
1001040
1001050
1001060
1001070
1001080
1001090
1001100
1001110
1001120
1001130
1001140
1001150
1001160
1001170
1001180
1001190
1001200
1001210
1001220
1001230
1001240
1001250
1001260
1001270
1001280
1001290
1001300
1001310
1001320
1001330
1001340
1001350
1001360
1001370
1001380
1001390
1001400
1001410
1001420
1001430
1001440
1001450
1001460
1001470
1001480
1001490
1001500
1001510
1001520
1001530
1001540
1001550
1001560
1001570
1001580
1001590
1001600
1001610
1001620
1001630
1001640
1001650
1001660
1001670
1001680
1001690
1001700
1001710
1001720
1001730
1001740
1001750
1001760
1001770
1001780
1001790
1001800
1001810
1001820
1001830
1001840
1001850
1001860
1001870
1001880
1001890
1001900
1001910
1001920
1001930
1001940
1001950
1001960
1001970
1001980
1001990
1002000
1002010
1002020
1002030
1002040
1002050
1002060
1002070
1002080
1002090
1002100
1002110
1002120
1002130
1002140
1002150
1002160
1002170
1002180
1002190
1002200
1002210
1002220
1002230
1002240
1002250
1002260
1002270
1002280
1002290
1002300
1002310
1002320
1002330
1002340
1002350
1002360
1002370
1002380
1002390
1002400
1002410
1002420
1002430
1002440
1002450
1002460
1002470
1002480
1002490
1002500
1002510
1002520
1002530
1002540
1002550
1002560
1002570
1002580
1002590
1002600
1002610
1002620
1002630
1002640
1002650
1002660
1002670
1002680
1002690
1002700
1002710
1002720
1002730
1002740
1002750
1002760
1002770
1002780
1002790
1002800
1002810
1002820
1002830
1002840
1002850
1002860
1002870
1002880
1002890
1002900
1002910
1002920
1002930
1002940
1002950
1002960
1002970
1002980
1002990
1003000
1003010
1003020
1003030
1003040
1003050
1003060
1003070
1003080
1003090
1003100
1003110
1003120
1003130
1003140
1003150
1003160
1003170
1003180
1003190
1003200
1003210
1003220
1003230
1003240
1003250
1003260
1003270
1003280
1003290
1003300
1003310
1003320
1003330
1003340
1003350
1003360
1003370
1003380
1003390
1003400
1003410
1003420
1003430
1003440
1003450
1003460
1003470
1003480
1003490
1003500
1003510
1003520
1003530
1003540
1003550
1003560
1003570
1003580
1003590
1003600
1003610
1003620
1003630
1003640
1003650
1003660
1003670
1003680
1003690
1003700
1003710
1003720
1003730
1003740
1003750
1003760
1003770
1003780
1003790
1003800
1003810
1003820
1003830
1003840
1003850
1003860
1003870
1003880
1003890
1003900
1003910
1003920
1003930
1003940
1003950
1003960
1003970
1003980
1003990
1004000
1004010
1004020
1004030
1004040
1004050
1004060
1004070
1004080
1004090
1004100
1004110
1004120
1004130
1004140
1004150
1004160
1004170
1004180
1004190
1004200
1004210
1004220
1004230
1004240
1004250
1004260
1004270
1004280
1004290
1004300
1004310
1004320
1004330
1004340
1004350
1004360
1004370
1004380
1004390
1004400
1004410
1004420
1004430
1004440
1004450
1004460
1004470
1004480
1004490
1004500
1004510
1004520
1004530
1004540
1004550
1004560
1004570
1004580
1004590
1004600
1004610
1004620
1004630
1004640
1004650
1004660
1004670
1004680
1004690
1004700
1004710
1004720
1004730
1004740
1004750
1004760
1004770
1004780
1004790
1004800
1004810
1004820
1004830
1004840
1004850
1004860
1004870
1004880
1004890
1004900
1004910
1004920
1004930
1004940
1004950
1004960
1004970
1004980
1004990
1005000
1005010
1005020
1005030
1005040
1005050
1005060
1005070
1005080
1005090
1005100
1005110
1005120
1005130
1005140
1005150
1005160
1005170
1005180
1005190
1005200
1005210
1005220
1005230
1005240
1005250
1005260
1005270
1005280
1005290
1005300
1005310
1005320
1005330
1005340
1005350
1005360
1005370
1005380
1005390
1005400
1005410
1005420
1005430
1005440
1005450
1005460
1005470
1005480
1005490
1005500
1005510
1005520
1005530
1005540
1005550
1005560
1005570
1005580
1005590
1005600
1005610
1005620
1005630
1005640
1005650
1005660
100

photovoltaic cell.

23. The method according to claim 21, further comprising depositing a photovoltaic cell on a surface of the battery.

5

24. The method according to claim 21, further comprising depositing a photovoltaic cell on a surface of the substrate beside the battery.

10 25. The method according to claim 21, further comprising depositing a photovoltaic cell on an opposite face surface of the substrate from the battery.

15 26. The method according to claim 21, wherein depositing the electrical circuit comprises:
depositing a photovoltaic cell on the battery;
supporting a charging circuit on the photovoltaic cell; and
electrically coupling the charging circuit to charge the battery using current from the photovoltaic cell.

20 27. The method according to claim 21, further comprising depositing a thin-film capacitor on the battery.

25 28. The method according to claim 21, wherein depositing the electrical circuit comprises:
depositing a thin-film capacitor on the battery;
mounting an integrated circuit on the capacitor; and
electrically connecting the integrated circuit to the battery and the capacitor.

29. The method according to claim 21, further comprising:

depositing an insulating layer on the battery; and
depositing a plurality of electrical traces on the insulating layer, wherein at least one of the plurality of electrical traces contacts an electrode of the battery through the insulating layer.

30

30. The method according to claim 21, further comprising:
depositing an insulating layer on the battery;
depositing a plurality of electrical traces on the insulating layer;
supporting an integrated circuit on the battery;
5 electrically connecting a first one of the plurality of electrical traces to the cathode of the battery and the integrated circuit; and
electrically connecting a second one of the plurality of electrical traces to the anode of the battery and the integrated circuit.

10 31. The method according to claim 21, wherein the substrate includes an integrated circuit,
the method further comprising:

depositing an insulating layer on the integrated circuit, the insulating layer including a plurality of through vias, wherein the battery is adjacent to the insulating layer;
electrically connecting the cathode of the battery to the integrated circuit through a first one of plurality of through vias; and
electrically connecting the anode of the battery to the integrated circuit through a second one of plurality of through vias.

15 32. The method according to claim 21, wherein the substrate includes an integrated circuit,
the method further comprising:

20 depositing an insulating layer adjacent to the integrated circuit, the insulating layer including a plurality of through vias;
depositing a cathode-conductor of the battery on the insulating layer;
electrically connecting the cathode-conductor of the battery to the integrated circuit
25 through a first one of plurality of through vias;
depositing the cathode layer of the battery on the cathode conductor;
depositing the electrolyte layer on the cathode layer;
depositing the anode on the electrolyte layer; and
electrically connecting the anode to the integrated circuit through a second one of plurality
30 of through vias.

33. The method according to claim 21, wherein the substrate includes an integrated circuit, the method further comprising:

depositing an insulating layer on the integrated circuit, the insulating layer including a plurality of through vias;

5 depositing a cathode-conductor of the battery on a face of the integrated circuit opposite the insulating layer;

electrically connecting the cathode-conductor of the battery to the integrated circuit through a first one of plurality of through vias;

depositing the cathode layer of the battery on the cathode conductor;

10 depositing the electrolyte layer on the cathode layer;

depositing the anode on the electrolyte layer; and

electrically connecting the anode to the integrated circuit through a second one of plurality of through vias.

15 34. The method according to claim 21, further comprising:

depositing an insulating layer on the battery that acts as a passivation layer that protects the anode from environmental corrosion;

20 depositing a plurality of electrical traces on the insulating layer, wherein at least one of the plurality of electrical traces contacts an electrode of the battery through the insulating layer.

35. The method according to claim 21, further comprising:

forming the substrate into a curved shape having a convex face and a concave face; and locating the battery on the concave face.

25 36. The method according to claim 21, wherein the substrate comprises a polymer having a melting point substantially below 700 degrees centigrade.

37. The method according to claim 21, wherein the substrate comprises a metal foil.

30 38. The method according to claim 21, wherein the substrate comprises a metal foil having an

insulative layer between the metal foil and the first conductive layer is deposited on a first surface area of the substrate's major surface area.

39. The method according to claim 21, wherein the substrate comprises a ceramic material.

5

40. The method according to claim 21, wherein the substrate comprises a glass material.

41. The method according to claim 21, wherein the depositing of the battery comprises:

depositing the cathode layer onto the first conductive layer;

10

depositing the electrolyte layer onto the cathode layer; and

depositing the anode material onto the electrolyte layer.

150
155
160
165
170
175
180
185
190
195
200
205
210
215
220
225
230
235
240
245
250
255
260
265
270
275
280
285
290
295
300

42. The method according to claim 41, wherein the depositing of the battery comprises depositing the cathode layer onto the first conductive layer and annealing a surface of the cathode material to a temperature higher than that of the electrical circuit underlying the cathode layer.

43. The method according to claim 41, wherein the depositing of the battery comprises depositing the electrolyte layer onto the first conductive layer and annealing a surface of the electrolyte layer material to a temperature higher than that of the electrical circuit underlying the electrolyte layer.

44. A method for making a combined battery and device apparatus, the method comprising:

providing an electrical circuit having a major surface area and having a first conductive layer on a first surface area of the electrical circuit's major surface area; and

25

depositing onto the first conductive layer a battery comprising a cathode layer; an anode layer, and a electrolyte layer located between and electrically isolating the anode layer from the cathode layer, the battery disposed such that either the cathode layer or the anode layer is in electrical contact with the first conductive layer, wherein the anode or the cathode or both include an intercalation material.

30

45. The method according to claim 44, wherein the depositing of the battery comprises:
depositing the cathode layer onto the first conductive layer;
depositing the electrolyte layer onto the cathode layer; and
depositing the anode material onto the electrolyte layer.

5

46. The method according to claim 45, wherein the depositing of the battery comprises:
depositing the cathode layer onto the first conductive layer and annealing a surface of the cathode material to a temperature higher than that of the electrical circuit underlying the cathode layer.

10

47. The method according to claim 45, wherein the depositing of the battery comprises:
depositing the electrolyte layer onto the first conductive layer and annealing a surface of the electrolyte layer material to a temperature higher than that of the electrical circuit underlying the electrolyte layer.

15

48. A combined battery and device apparatus comprising:
a first structure including:
a substrate having a major surface area;
a first conductive layer adjacent to a first surface area of the substrate's major surface area;
a battery comprising a cathode layer; an anode layer, and a electrolyte layer located between and electrically isolating the anode layer from the cathode layer, the battery disposed such that either the cathode layer or the anode layer is in electrical contact with the first conductive layer, wherein the anode or the cathode or both include an intercalation material; and
20 an electrical circuit adjacent to and electrically connected to the battery.

25

49 The apparatus according to claim 48, further comprising:
a photovoltaic cell adjacent to the first structure; and
an integrated circuit operatively coupled to charge the battery using current from the photovoltaic cell.

30

50. The apparatus according to claim 48, further comprising a photovoltaic cell adjacent to a surface of the battery.

51. The apparatus according to claim 48, further comprising a photovoltaic cell adjacent to a surface of the substrate beside the battery.

52. The apparatus according to claim 48, further comprising a photovoltaic cell adjacent to an opposite face surface of the substrate from the battery.

10 53. The apparatus according to claim 48, wherein the electrical circuit comprises:
a photovoltaic cell adjacent to the battery; and
a charging circuit supported on the photovoltaic cell and electrically coupled to charge
the battery using current from the photovoltaic cell.

15 54. The apparatus according to claim 48, wherein the electrical circuit includes a thin-film capacitor adjacent to the battery.

20 55. The apparatus according to claim 48, wherein the electrical circuit includes:
a thin-film capacitor adjacent to the battery; and
an integrated circuit mounted on the capacitor and electrically connected to the battery
and the capacitor.

25 56. A combined battery and device apparatus comprising:
a substrate;
first conductive layer adjacent face-to-face to the substrate;
a battery having a plurality of layers including:
a cathode layer;
an anode layer; and
an electrolyte layer located between and electrically isolating the anode layer from
30 the cathode layer, wherein the anode or the cathode or both include an intercalation material, the

battery disposed such that either the cathode layer or the anode layer is in electrical contact with the first conductive layer; and

5 an electrical circuit adjacent face-to-face to the substrate; wherein the electrical circuit has a plurality of layers, and one of the plurality of layers of the electrical circuit and one of the plurality of layers of the battery have substantially identical thicknesses, chemical composition and material characteristics.

57. The apparatus according to claim 56, wherein two or more of the plurality of layers of the electrically powered device have a composition substantially identical to and a thickness substantially identical to two or more respective layers of the plurality of layers of the battery.

10 58. The apparatus according to claim 56, wherein the anode includes a lithium-intercalation material.

15 59. The apparatus according to claim 56, wherein the cathode includes a lithium-intercalation material.

20 60. The apparatus according to claim 56, wherein the solid-state electrolyte layer includes a LiPON material.

25 61. The apparatus according to claim 56, wherein the anode includes a lithium-intercalation material, the cathode includes a lithium-intercalation material, and the solid-state electrolyte layer includes a LiPON material.

62. A method for making a combined battery and electrically powered device, the method comprising:

providing a substrate having a major surface area;

30 depositing a plurality of layers of the battery on a first surface area of the substrate's major surface area, wherein the plurality of layers of the battery include a cathode layer; an anode layer, and a solid-state electrolyte layer located between and electrically isolating the

anode layer from the cathode layer, wherein the anode or the cathode or both include an intercalation material or a metal or both; and

depositing a plurality of layers of the electrically powered device on a first surface area of the substrate's major surface area, wherein one of the plurality of layers of the electrically powered device has a composition substantially identical to and is deposited substantially simultaneously with one of the plurality of layers of the battery.

5 63. The method according to claim 62, wherein two or more of the plurality of layers of the electrically powered device have a composition substantially identical to and are deposited
10 substantially simultaneously with two or more respective layers of the plurality of layers of the battery.

15 64. The method according to claim 62, wherein the anode includes a lithium-intercalation material.

65. The method according to claim 62, wherein the cathode includes a lithium-intercalation material.

20 66. The method according to claim 62, wherein the solid-state electrolyte layer includes a LiPON material.

67. The method according to claim 62, wherein the anode includes a lithium-intercalation material, the cathode includes a lithium-intercalation material, and the solid-state electrolyte layer includes a LiPON material.